Vol. 24, No. 1 THE JOHNSON NATIONAL DRILLERS' JOURNAL Jan.-Feb., 1952

GROUND WATER RESOURCES AND THEIR CONSERVATION

THE WATER SITUATION IN THE UNITED STATES

Seldom a week goes by that some one, either a would-be authority, a public official, or scare-head publisher, raises the cry that the country is faced with a water shortage. Nothing could be farther from the actual facts. For this reason a review of the water situation as we know it today should be of interest to those whose livelihood depends on water.

Recently a report of the water situation by states was made by the U. S. Geological Survey for the Water Resources Policy Commission, which had been appointed by President Truman to work out a water policy for this country. Both of these reports are available to those interested. We will draw upon them for the facts as we outline them for our readers.

First, we must start at the beginning by considering briefly the hydrologic cycle which embraces all water in existence in any form, either in the air, on the ground or below ground. This vast quantity of water is a living thing, constantly changing form and moving from place to place with the seasons and the years. It has been stated that the total quantity of water in existence today is substantially the same as that in existence when the Earth was created, as there is no way in which water as such can be destroyed. Be this as it may, the water we are concerned with is that which reaches the surface, whether it be rain, hail, snow, sleet or dew. This is the water we are interested in for the reason our daily economy depends upon it for existence.

As we go into the New Year the material situation becomes more complicated than ever. Drillers should familiarize themselves with the regulations and govern themselves accordingly, otherwise they may be the innocent victims of the situation.

We will be glad to help any one at any time who is having trouble making out their applications for allotments of material.

We know that a portion of this water is evaporated from water and land surfaces; still more is discharged into the air through the leaves of trees and plants; still another portion seeps downward into the ground past the plant roots and into the underlying formations. This part continues to percolate downward until it joins up with the water table which is the upper surface of ground water in storage. Below this point the openings in our ground formations are full of water.

The water in these formations, with few exceptions, is slowly moving under the force of gravity to some lower point. It moves much slower than people think but eventually it reaches its destination or changes form, but no matter what distance it travels or how many times it changes form or position in its travels, it is still water and a part of the everchanging, everlasting hydrologic cycle.

Under natural conditions ground water may find an outlet directly into a river, or the sea, or it may appear at the surface as a swamp or a spring. By far the largest part of ground water is discharged into streams where a portion is lost by evaporation. Water may be taken from a stream and all or part of it be used, or if ground water it may flow to an irrigation well to be pumped out onto the surface where some of it will be used up in evaporation and transpiration, and part will return to the ground water table.

The part that our water-bearing formations play in this constant shifting of water from one place to another should be of particular interest to well drillers, as these formations not only control the amount of water in storage but its rate of movement and the amount of water that can be taken out of them by wells.

It is well known that our ground water reservoirs are able to absorb large amounts of water quickly and that they give up this water slowly. In the Sacramento Valley in California the storage capacity between 20 and 200 feet is estimated at 34 million acre-feet, or about one and a quarter times the usable capacity of Lake Mead. While the usable capacity of the Sacramento Valley is much larger than the average for ground water reservoirs over the country as a whole,

(Continued on Page 2)

T. W. Van Winkle & Son of Salem, Iowa recently completed a 12-inch well 162 feet deep for the W. A. Sheaffer Pen Company at Fort Madison, Iowa. Twenty feet of Johnson Everdur Screen was used in the well which produced 1,000 g.p.m. with a 20-foot drawdown when pump tested. The men in the picture are Red Adams and Bill Weisel, drillers, and Harold Hampton and Orval McDowell, helpers. Mr. Van Winkle's drilling rig is shown in the background.

THE WATER SITUATION IN THE UNITED STATES

(Continued from Page 1)

it shows that the total is tremendous, much more than all of our man-made reservoirs put together.

The capacity of our formations to hold water depends entirely on the nature of the rocks making up the formation. Underneath all of the United States there is a solid, dense granite-like base beyond which there is no ground water for practical purposes. Above this basement floor we have all kinds of rocks varying from thick stratas of limestone and sandstone to heavy thick deposits of sand, gravel, clay, and silt. All of the rocks above the "base" will yield a little water if water can get into them and move through them. Therefore, the capacity of the rocks which make up water-bearing formations to hold and give up water varies widely. The most productive rocks are the cavernous limestones and the lava rocks, then come the sandstones.

More important from the nation's standpoint than these rocks are the widespread and varied deposits of sand and gravel which yield the bulk of the ground water produced in this country. The least important, as far as water is concerned, are the deposits of clay, shale, volcanic ash, or the hard solid rocks above the basement floor.

The total storage capacity of our underground reservoirs is enormous. According to the report only rough estimates are available but these indicate that the amount of water stored is many times greater than all of our streams, lakes, and reservoirs, excluding the Great Lakes. There is a great difference between the actual or total storage and usable storage. This we know from clay which may have a porosity of 50 per cent and be filled with water, but will not give up enough water to support a well, or taking the case of clean coarse gravel with a porosity of 25 per cent which will yield practically all of its water readily.

For these reasons our ground water reservoirs are of two types, those which have a high rate of recharge, with a free flow and from which large amounts of water can be taken easily and steadily, and those with a low rate of recharge, restricted flow and from which only limited amounts of water can be taken without reducing the amount in storage. We already have several of the second type which are being overpumped and will be exhausted if not soon controlled.

Examples of the first class are the limestones of Florida, the alluvium of some of the western basins, and the glacial sands and gravels of the Ohio Valley and the Pacific Northwest. Examples of the second class are the sands and gravels of the High Plains, the Dakota sandstone and the limestones, sandstones, and shales in the Middle West.

The report gives a very clear picture of the distinction between water table and artesian conditions in our ground water reservoirs and the importance of these distinctions with relation to usable storage capacity. Many of us do not fully appreciate these differences when considering ground water developments though we fully understand the difference when it comes to pumping.

Artesian beds or aquifers are full of water at all times. When water is withdrawn from such a bed through a well the water is taken from storage by the compaction of the bed and by a slight expansion of the water itself as the pressure is lowered. When water is withdrawn from an aquifer by

(Continued on Page 3)

Mr. John Hocken of Cape Town, South Africa drills with the type of machine shown in the picture. Mr. Hocken says he could use some improvements, but we know he is putting down wells up to 150 feet deep and 6 inches in diameter with good results.

Mr. W. T. Kizer of Palestine, Texas drills wells with an auger. He is 74 years old and has been putting down wells by this method for over 30 years. While the picture does not show the auger used by Mr. Kizer, it does show the horse used to power the rig.

(Continued from Page 2)

means of a water table well the water is actually taken from storage by drawing or dewatering the formation until an equilibrium or balance is set up between the water being taken out of storage and the water being taken in by recharge.

Therefore the storage capacity or specific yield of a water table formation is much larger than that of an artesian aquifer and each type of formation acts differently under pumping. As is well known, a water table well creates a cone of depression or withdrawal in the vicinity of the pumping well. The artesian well under pumping creates changes in pressures in the vicinity of the well, which if plotted have the same general shape as a cone of depression, but are considerably different.

Water table aquifers act similar to surface reservoirs in that stored water can be taken from them and then be replenished between periods of pumping. In the case of artesian aquifers the effect of withdrawals reach the outcrop areas relatively soon, after which the rate of decline of the water table slows down and may stop entirely if the lowering induces increased recharge or cuts down natural discharge. Only water table aquifers can be recharged directly from the surface, as artesian aquifers must be recharged from areas where there is no confining bed. In general, water table formations have the greatest recharge and yield and are most easily developed and managed.

The recharge of ground water reservoirs is of interest and importance though little thought is given to it in the average ground water development. Ground water is recharged in two principal ways, either by infiltration from precipitation or infiltration from surface waters. Generally speaking, recharge from precipitation is the principal process in humid sections and from stream flow in the arid sections. Recharge is therefore seasonal. In the Northeast, Midwest and Northwest it is in the spring of the year as the water table is low. As summer comes on with higher rates of evaporation and transpiration and increased pumping the water table drops. It may be restored to a limited extent in the fall, but it continues to drop during the winter reaching a low just before the spring recharge. This cycle varies of course in different parts of the country depending on local use and rainfall conditions.

In the arid western states precipitation such as rain and snow is caught in the mountains. Only exceptional rainfalls add to ground water storage by infiltration from the surface. In the intermountain valleys of the West great beds of coarse outwash material are found where the mountain streams empty into the valleys. The accumulated precipitation from the mountains is discharged onto these porous beds and we have recharge from stream flow.

In the same way that recharge is not fully appreciated, just so is ground water movement misunderstood by many. The popular conception of ground water flow is that it is similar to a stream flowing on the surface. In a way this is true as both depend on gravity for their rate of movement. There is a vast difference in the rate of flow, however, as ground water moves much more slowly by comparison and occurs in several different forms or types of flow. Practically speaking, ground water flows through permeable rocks and between or around impermeable ones. The movement of water through a formation is therefor controlled by the geology of the formation but so long as there is a difference in head there will be movement of some kind.

(Continued on Page 4)

One of the modern well drillers in New York State is Lyndon C. Caster of Fulton. Mr. Caster not only drills wells but sells pumps, makes pump installations, and repairs. Most of his installations are in wells drilled in rock.

THE WATER SITUATION IN THE UNITED STATES

(Continued from Page 3)

By the same token, if water moves through a formation or ground water reservoir, it must be discharged somewhere at a lower elevation. This may take ages of times and thousands of years, but eventually ground water will find an outlet. In doing so, some of it will be discharged at the surface as springs, some of it will be discharged from the surface by evaporation or transpiration, some of it will be withdrawn by wells, or it may leak off into other water-bearing formations. Whatever its travels some of it finally reaches the sea. Thus over a long period of time the discharge of a ground water reservoir is equal to the average recharge minus losses due to evaporation and transpiration.

Inasmuch as the source of ground water is precipitation, it is apparent that our weather has much to do with ground water. If precipitation decreases and dry weather increases, there is less water. If the condition is reversed, there is more water. Dry and wet periods alternate during the year. the dry and wet years follow each other as do dry and wet periods of years. At the present time there is evidence of a gradual decrease in precipitation and rise in temperature during the last 50 years, but there is no reason to assume that this trend will continue indefinitely as we know there have been periods of more precipitation and cooler weather in our past. There is nothing in the picture which even slightly indicates that this country will ever become a Sahara Desert. What we do need is more study of our soils, streams, ground water reservoirs and water uses to determine the best way to conserve the water now going to waste through a lack of proper control and use.

In this connection, some consideration should be given to the part ground water formations play as balancing reservoirs in reducing flood peaks and sustaining flows in streams. Some of our largest springs are allowed to flow to waste, others contribute to stream flow, such as the immense springs along the Snake River in Idaho. Whatever the flow of these springs may be, it is small compared to the total flow of ground water from springs. If we consider for a moment the average rainfall of the United States is about 30 inches. A little more than 21 inches is evaporated and transpired and a little less than 9 inches runs into the ocean. The 9 inches represents an average flow of 1,800,000 cubic feet per second. It is estimated that between one-third and two-fifths, or about 600,000 to 700,000 cubic feet per second, has passed through ground water reservoirs before entering the streams. This proves the importance of ground water as a contributor to stream flow and also points out the fact that both ground water and surface water are to a certain extent dependent on each other.

The M & R Drilling Company of Yardville, New Jersey operates two rigs in that area, mostly in shale, clay, sandstone, and rock. The Cyclone rig shown is putting a well down for a suburban home supply.

The Omaha Drilling Company constructed 45 wells in connection with the Fort Randall Dam project in South Dakota. The picture shows one of their rigs being moved over a well site in order to carry out their contract.

The quality of ground water enters into many developments, particularly those for municipal, industrial, and irrigational supplies. Ground water contains many things other than hydrogen and oxygen in the proportion H_2O. Water first picks up impurities from the air, then from the surface and even from the formations it flows through as ground water. There is also some filtration taking place at the same time so that by the time it reaches us nearly all ground water is good from a sanitary standpoint. It usually contains chemicals, such as mineral salts which are not harmful. If it did not, we would not drink it. It depends entirely on the use of water as to the amount of bacteria or

(Continued on Page 5)

(Continued from Page 4)

chemicals it may contain. Water to be drunk must not contain harmful bacteria, or amounts of iron chloride, magnesium and other compounds in excess of the safe limits for human consumption. Each state and the U. S. Bureau of Public Health have set up standards governing these things and maintain laboratories to inspect all public water supplies. Barring accidents or unforeseen contamination our public water supplies are safe and of the required quality at all times.

While considering ground reservoirs in their natural state, we must also give thought to the effect of withdrawals from them by pumping or otherwise. Ground water reservoirs are naturally in a state of equilibrium, their levels rise and fall with the seasons and years, but over a long period of time the water added to them is balanced by the amount discharged under natural conditions.

When a well is pumped, water is withdrawn and new conditions of equilibrium are set up in the vicinity of the well. If too many wells are located in a given area, the withdrawals from storage in that area may exceed the rate at which the water can be replaced or recharged. It follows then that for a given rate of pumping more water can be withdrawn from wells spaced far apart than wells spaced too closely to each other. It is important, therefore, to know what effect a pumping well is having on an aquifer and guard against wells being located so closely together that they will interfere with each other when pumped.

The Rice family has been drilling wells in the Upper Peninsula of Michigan for 50 years. The picture shows Fred S. Rice of Escanaba, Michigan with his helper drilling a well near their home town.

The A. E. Mueller Well Company of Gaylord, Minnesota operates as a father and son combination. Both of these men are experienced, progressive well drillers, doing all sorts of work, constructing shallow screened and gravel treated wells or drilling deep rock wells as the situation may require. In the picture they are running a pump test on a new city well in Minnesota constructed under the supervision of Winston C. Larson, Consulting Engineer of Detroit Lakes.

When investigating the possibilities of an aquifer to yield water, two things must be determined; the yielding ability of the formation or its ability to transmit water, and its storage capacity. Such determinations are possible by methods developed by the U. S. Geological Survey in the last twenty years. The trouble in most cases is that these fundamentals are not determined prior to making the development. Later on after the development has started to fail, these investigations are made in order to determine the cause of failure, rather than make them prior to the development and prevent a failure. Actually it is now possible to determine the effect of withdrawals from non-uniform aquifers and those limited by hidden barriers or having areas of discharge or recharge within the range of the pumping.

Man has used many schemes in order to recharge ground water reservoirs, some of them with more success than others. In places in the West recharge is accomplished by placing wells near surface streams and then pumping out the water that would otherwise discharge into the stream. In other places streams are diverted onto the surface and the underlying formations recharged by direct infiltration. The return water of irrigation which seeps downward adds to the ground water supply but as far as ground water is concerned this return water may or may not be beneficial depending on whether or not low lying areas become water-logged. Evaporation and transpiration from the exposed water surfaces and shallow water table removes some of the water but in doing so it leaves an accumulation of mineral salts in the soil and on the surface which soon form "alkali" conditions.

Thousands of acres have been ruined or put out of production in the irrigated areas of the West from surplus return water. The installation of drainage systems or pumping to lower the water table is the only known relief but too often these remedies are not adequate and the areas involved are permanently damaged.

To sum up, each ground water reservoir has a safe yield or rate of withdrawal that can be develop-

(Continued on Page 6)

THE WATER SITUATION IN THE UNITED STATES

(Continued from Page 5)

ed for human use. It is not a fixed quantity, as it depends on many factors, such as the manner in which wells are located and pumped, in addition to the natural ability of the reservoir to hold and give up water. By designing ground water developments properly and taking full advantage of the geologic and hydrologic characteristics of ground water reservoirs, they can often be made to yield more water safely than they do in their natural state. In other words, if a ground water reservoir is not operated within the limits of safe yield, then the withdrawals are simply mining operations with the ground water levels being reduced until they reach the lowest practicable stage, after which withdrawals are limited to natural recharge, less natural discharge under the changed reservoir conditions. Such conditions are occurring now in central and southern Arizona, in California and the High Plains of Texas. To some extent mining of water has occurred in the Dakota sandstone under the Great Plains and in the limestone and sandstone formations of Illinois, Wisconsin, and adjacent areas.

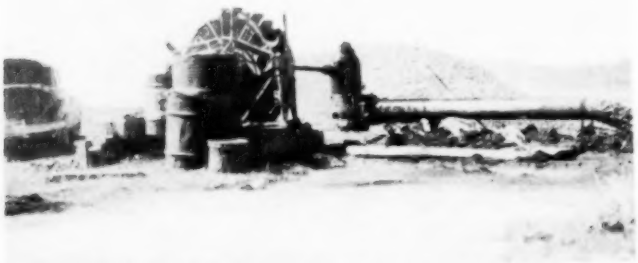
The maximum use of ground water reservoirs over a long period of time is therefore limited to their safe yield, rather than unlimited pumping or mining of water. It must be conceded that we are willing to leave tremendous quantities of water in our ground water reservoirs in order to be able to operate them on a safe yield basis, otherwise ground water withdrawals in excess of the safe yield will eventually use up all the storage. It would seem that our first job in developing a ground water reservoir was to determine its safe yield and whether or not any of the stored water is to be mined and if so, how much. Once it is realized that a reservoir is being pumped out, the economic, legal, and hydrologic questions raised become vastly more complicated and difficult. As yet there is no satisfactory solution to these questions except a mutual and voluntary reduction in withdrawals until the reservoir has restored itself and its safe yield determined.

There are many other phases of ground water use and conservation which have a bearing on the future supplies that can be secured from our ground water reservoirs, such as salvage of natural waste of ground water. The possibilities of induced and artificial recharge can be investigated and further utilized, as can the problems connected with salt water encroachment and contamination by wastes. When we have solved all of these problems and have our ground reservoirs at their maximum storage capacity, we still have the problem of control and management, otherwise we are back to where we are today. This one phase of ground water is probably the most important of all, if we are to maintain our ground water supplies and still be able to use them to support our economy to the fullest advantage.

The use of water, both surface and ground, has been thoroughly studied in recent years and the estimates of total use are still inadequate. All the while we are making more use of water and the public is becoming more aware of the value of water. Several years

(Continued on Page 7)

The Torgrude family of well drillers has operated in the vacinity of Sinai, South Dakota for nearly 50 years. The father, Hjelmer, started the business which is now carried on by his son, Bernard. The picture shows both with their well drilling rig which was built and patented by J. H. Jensen in August, 1901. It weighs 9,000 pounds and can put down 3-inch holes to a depth of 800 feet.



Irrigation well in the Buck Horn Valley, Utah being developed by pumping. The well was drilled by the Davis Alcorn Company of California. Note the airplane engine driving the pump through a geared head.

(Continued from Page 6)

ago Dr. W. F. Guyton, then with the U. S. Geological Survey, estimated the use of ground water in 1945 as follows:

Irrigation	10 billion gallons per day
Industrial	5 billion gallons per day
Municipal	3 billion gallons per day
Rural	2 billion gallons per day

These figures are probably more at the present time. The use of surface water for public supplies was estimated to be about 9 billion gallons per day in 1945, with the present use larger. One big question is the amount of surface water used and estimates of this vary from 30 to 100 billion gallons per day. It is estimated roughly that the use of ground water has approximately doubled form 1935 to 1945. Therefore, it may be 25 billion gallons per day or more at this time.

As a whole, the water situation over the country is not bad or anything to get alarmed about. True, there are critical areas where more water could be used and where none is available. In many of these places, shortages have been created by our developments exceeding the water available. This cannot be charged to water shortage but to lack of foresight and judgment, by those creating the shortage. This is particularly true in the West where agricultural and industrial users of water have far exceeded the water supplies available.

Joseph, George, and Nick Miskulin, brothers, of Calgary, Alberta, Canada, are experts in putting down and cementing large casing. In the picture they are running 16-inch casing to bedrock and drilling on to 400 feet to set and grout 10¾ inch surface string.

Briefly the water situation by sections can be summed up as follows:

(1) The Atlantic and Gulf Coastal Plains are favorably located as far as water is concerned and with adequate study of ground water and stream flow, followed by intelligent development this section will have an ample supply of water as far as we can see into the future.

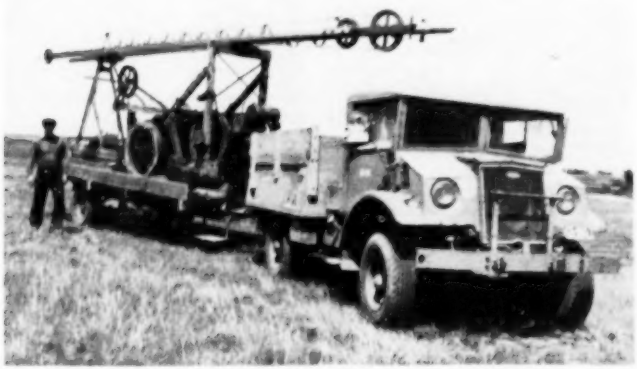
(2) The East-Central Region is an area that is deficient in ground water in many places but with considerable surface water available. As a whole, there is sufficient ground water for domestic use and local industry, but there are a number of areas such as the Chicago area where more ground water could be used if it were available. On the other hand, there are many places along the streams and areas such as northern Indiana and the Lower Peninsula of Michigan where further ground water supplies can be developed.

The demands for water in the future will have to be met by the increased use of ground water in areas now underdeveloped and by providing more storage for dry season water supply.

(3) The Great Plains Region probably has more water in ground water reservoirs than any other area. Conditions in different sections vary of course with local conditions and uses of water. As a whole, the fullest use can be made of the water available in this area, provided future developments are carefully planned and the problems of established water and states rights taken into account.

(4) The Western Mountain Region problems are the most serious at the present time as there is no part of the country where a

(Continued on Page 10)



Martin Sundin operates the drilling rig shown in the area of Viscount, Saskatchewan, Canada. He has many successful wells to his credit in that area.

JOHNSON NATIONAL DRILLERS JOURNAL

A National Journal Published in the Interest of the Well Drilling and Water Supply Industry.

Copyrighted 1952 by
EDWARD E. JOHNSON, INC.
Publishers
ST. PAUL, MINN.

W. M. Bollenbach—
Business Manager
E. W. Bennison.....Editor

Address All Communications to EDWARD E. JOHNSON, INC., 2304 Long Ave., St. Paul, Minn.

The contents of this journal are copyrighted and must not be reprinted or published without giving proper credit to the authors and this journal. Permission to use articles and to make any minor changes which may be indicated as desirable, together with illustrations, will gladly be given to any responsible parties upon request.

Colorado
Archie Hier, President.....Sedalia
Geo. C. Koogle, Secretary.....Denver

Empire State
Ray Knapp, President.....Clarence
Robert Klindt, Secy.-Treas.....Morris

Florida
J. P. Carroll, President.....West Palm Beach
R. M. Vickers, Secretary.....Miami

Idaho
Jim Schoonover, President.....Burley
W. B. Bowler, Sec'y-Treas.....Boise

Illinois
J. T. Anderson, President.....Morris
Richard Fisher, Executive Sec'y.....Urbana

Indiana
Walter Gordon, President.....Churubusco
H. K. Carr, Secretary.....Greentown

Iowa
C. L. Jennings, President.....New London
Travis C. Parker, Sec'y-Treas.....West Branch

Kansas
Wesley Weishaar, President.....Scott City
J. G. Lassey, Sec'y-Treas.....Miltonvale
A. R. Leonard, Service Secretary.....Lawrence

Louisiana
A. S. Holliday, President.....Jonesboro
L. C. Houston, Sec'y-Treas.....Shreveport

Michigan
Leo Riegler, President.....Muskegon
Harold Armstrong, Sec'y-Treas.....Battle Creek

Minnesota
John Hoge, President.....St. Paul
Al. A. Zuercher, Sec'y-Treas.....St. Paul
Norm Ovram, Service Sec'y.....St. Paul

Mississippi
W. Kenneth Journey, President.....Greenwood
Fred Sutter, Secretary-Treasurer.....Pass Christian

Missouri
Ben. H. Dake, President.....Mountain Grove
Dale L. Fuller, Service Secretary.....Rolla
Roy Wallace, Secretary.....Rolla

Montana
A. Russell Mowbray, President.....Missoula
B. M. Whitmer, Secy.-Treas.....Circle

Nebraska
H. O. Parkert, President.....Hooper
Vincent H. Dreessen, Secretary-U. of N., Lincoln

Nevada
S. R. McKinney, President.....Las Vegas
William Wright, Vice-President.....Dyer

New England
Edwin H. Hartley, President.....Turners Falls, Mass.
Vincent Sullivan, Secretary.....Oakdale, Mass.

New Jersey
Fred Bock, President.....Rochelle Park
Chas. Greenhalgh, Secretary.....Lakewood

North Carolina
R. O. Heater, President.....Raleigh
P. Y. Bainbridge, Secy.-Treas.....Guilford

North Dakota
Alfred Jaeger, President.....Mooreton
Fred V. Sletvold, Sec'y-Treas.....Oakes

Northwest
M. West, President.....Salem, Oregon
Frank Gaut, Secretary.....Beaverton, Oregon

Ohio
L. P. Cranz, President.....Ira
E. D. Allen, Sec'y-Treas.....Steubenville

Oklahoma
Bill Wallace, President.....Oklahoma City
L. J. Clarke, Sec'y-Treas.....Oklahoma City

Oregon
Ed Steinman, President.....Portland
Art Gaunt, Secretary.....Aloha

Pennsylvania
EASTERN DIVISION
John H. Rulon, President.....Philadelphia
Thomas Magee, Secretary.....Philadelphia 25
WESTERN DIVISION
G. W. Walters, President.....Rimersburg
Mrs. Muriel Butcher, Secretary.....Washington

Rhode Island
D. O. Hamilton, President.....Portsmouth
D. E. Whelan, Secretary.....Providence

South Dakota
Roy Magnus, President.....Webster
Harold Norbeck, Secretary.....Redfield

San Joaquin Valley (California)
Jack De LaGrange, President.....Madera
Glen V. Slater, Secretary-Treasurer.....Fresno

Texas
O. F. Jensen, President.....Houston
Geo. Ringstaff, Secy.-Treas.....Houston

Virginia
J. G. Perry, President.....Richmond
Jack Sundquist, Secretary.....Norfolk

Washington State
Oliver F. Zinkgraf, President.....Spokane
O. E. Erdman, Sec'y-Treas.....Elma

Wisconsin
Beck Goldbeck, President.....Appleton
Ralph H. Nienow, Executive Secretary.....Merrill

TOM'S COLUMN

Dear Fellows:

Well sir, fer a man who was raised where blizzards usually are

part of our every day goings on, it ain't fer me to start complainin' when snow drifts gang up on the old rig, and a slug of frozen sleet adds up to some choice profanity. I gotta admit tho' that a few of these weather combinations has been throwin' us fer a loop lately. After I got to readin' about what was happenin' out there in sunny California, it looks like the weather man ain't playin' no favorites. Lookin' back over what now seems to be an awful lot of tough winters, I've always found that spring came poppin' along before I got around to doin' what I'd been talkin' about doin' all through the winter days. It ain't hard to put things off when it looks frosty outside an' pleasantly warm by the fire on the inside. But there ain't no substitute for doin' today's jobs today. If we're smart now's the time fer checkin' the outfit and whatever equipment we got. We are goin' to have a tough time gettin' hold of material, to say nothin' of manpower in the season that's just around the corner. If we can do our chores now in puttin' everything in shape, it won't be half as costly in time an' labor than if we wait.

When you get around among people in different sorts of work and business, seems like they all figger that most of the headaches belongs to their particular job. Same way with drillers. We do a lotta belly-achin' because of material and other restrictions that sure do make for aggravation, but we're just one group with some production problems. Believe me, brother, everybody is havin' 'em. Come to think of it, I don't remember a time when most of us wasn't puttin' up a holler about something or other. It's mostly a matter of adjustin' yourself to what's needed to finish the job.

In these changing times you can't help realizin' the value of good organization work if you're plannin' on stayin' in the drillin' business. Things are shapin' up for greater understandin' and recognition of well drillin' and its importance to good water supply. You'll see tighter laws, and gover'ment regulations, there'll be plenty of need fer knowin' more about what's goin' on. That's why I figger a driller ought to get into his state Drillers Association. If you've paid any attention to what's been goin' on lately, you'll see the trend I'm talkin' about. Just last year the drillers in Wisconsin started a new movement that called fer state-wide licensing of well drillers. At the first meetin' there was only a few drillers who met up with the state officials. However, the officials were glad to meet with the drillers because they were able to learn a lot about the practical problems of well drillin' that changed their notions about puttin' in certain regulations that would

(Continued on Page 9)

(Continued from Page 8)

be impractical and maybe unworkable. The result was they decided to hold up these preparations for state regulations until they could meet with the state association of drillers at their annual meeting. Well, when they did meet, the drillers had a chance to have some say in setting up the matter of license fees, highway regulations fer drillin' equipment, and other things. It's just common sense to take your business seriously enough to help keep it from bein' bogged down in red tape. The way to do it is fer drillers to have the kind of state organizations that legislators will listen to. This same thing is goin' on in the State of Michigan. There again the state officials have met up with the Board of Directors of the state drillers association, and there'll be a report fer discussion at the annual meetin' in June.

The local driller groups can deal with the matters that touch on their own locality, but it takes a state association to get down to brass tacks with the fellows who write laws or set up regulations. The handwritin' is on the wall fellows—every state will be goin' after new and more rigid water supply regulations sure as shootin'. It's just good business to support your state association and do what you can to make it more effective. Not only the politicians, but every gover'ment department head has a healthy respect for organizations 'specially when they know what they're talkin' about.

There's gonna be plenty of good jobs comin' up in '52. To meet the situation a lot of us drillers will have to get off the rocker and make use of our ingenuity and experiences, because the material and manpower thing ain't goin' to get any better in the immediate future.

Well, there's a tow truck waitin' outside so I'd better get ready fer some plain an' fancy cussin'. Good luck to you all fer a bang-up New Year.

Yours truly,

TOM.

—o—

THE LEGAL STATUS OF WATER

In view of the fact that the use of water in this country is increasing rapidly and probably will increase still more in the years to come, it is of interest to review the situation as far as the present laws controlling the appropriation and use of water are concerned.

W. C. Newman of Alton, Missouri operates a 21-W Bucyrus-Erie drilling rig in the area of Thayer, Alton, Couch, and Oregon Counties. Mr. Newman is shown with his brother, A. L. Newman, both of whom started drilling for their father. These progressive drillers operate their own shop where they manufacture the casing they use and keep their equipment in shape.

It is apparent that the increased use of water will make heavier demands on our ground water reservoirs and that this further development will require regulation to protect our streams and ground water reservoirs from overdevelopment and pollution. This can only be done by "water laws" that are fair and based on a clear understanding of the hydrologic principles involved.

Many of our present so-called "water laws" are not sound from an engineering standpoint, being based on legal principles coming down from ancient court rulings based on a limited knowledge of water, whether it was on the surface or underground. As a result, many of our present water laws are full of conflicting terms, outmoded ideas, and wrong conceptions of the function of water in our present-day economy.

Some of these inconsistencies in the water law of the past are the use of such terms as "watercourses," "percolating waters," "diffused surface waters," etc. In many states one rule of law is applied to surface streams and another to ground water, without any clear distinction between the two.

There are two general doctrines of water law in use in this country, the older one being the common law doctrine of riparian rights and the newer being the doctrine of prior appropriation. Many people interested in water law do not have a clear understanding of the difference between these doctrines. Land owners living along streams talk glibly about their riparian rights and many well owners feel that they have a "right" of some kind due to the fact that there is water under their land and they have a well. All the while these people may be living in a state operating under the doctrine of appropriation or some other doctrine which does away with riparian rights or rights of any kind.

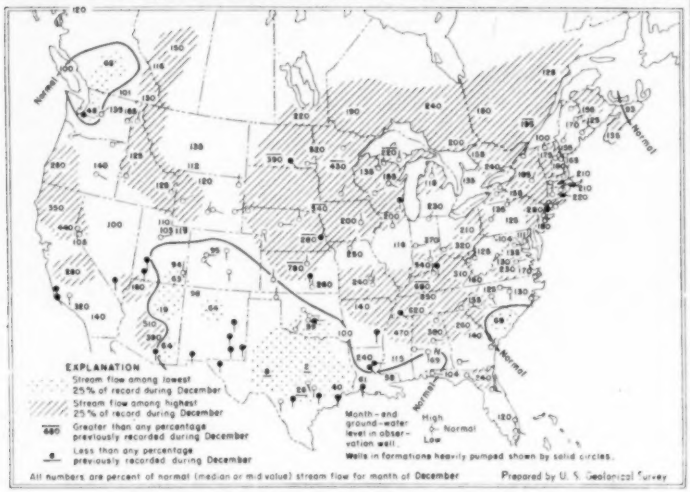
The two doctrines of water law we have mentioned are generally used but are diametrically opposed to each other. A riparian right is based on the ownership of land alongside a stream. It gives the owner use of the full natural flow, undiminished in quality or quantity. If there is such a thing as a riparian right to ground water, it is based on the ownership of land beneath which there is a water-bearing bed. A riparian right is not lost because an owner does not use it. It is inherent with the land.

On the other hand, a "water right" secured by appropriation is a right to divert and use water that has been declared to belong to the public. Under this doctrine which is a part of the basic law of the state, the prior or first appropriators have the better or higher right. Later appropriators take what is left after the prior appropriators have received their appropriations. Such rights are generally limited to beneficial uses and are forfeited when not used for a certain length of time.

Due to the wide differences in water laws between the states, there will have to be some revisions that will insure the uniform application or rule of law as far as ground water is concerned. As a matter of fact, this lack of uniformity in water law has led to special rules of law already, as witnessed by the so-called American

(Continued on Page 12)

SURFACE and GROUND WATER CONDITIONS


EXPLANATION
Stream flow among lowest 25% of record during December
Stream flow among highest 25% of record during December
Greater than any percentage previously recorded during December
Less than any percentage previously recorded during December
Month-end ground-water level in observation well.
High
Normal
Low
Wells in formations heavily pumped shown by solid circles.
All numbers are percent of normal (median or mid-value) stream flow for month of December
Prepared by U. S. Geological Survey

STREAM FLOW AND GROUND WATER IN RELATION TO NORMAL, DECEMBER 1951

According to Water Resources Review issued by the Geological Survey, Department of the Interior, runoff during November, 1952 was predominantly above normal throughout most of the United States and Canada and ground water levels in the United States were generally above normal. The drought in Texas continued with little change but there are indications that the drought in the Southwest is becoming less severe and the drought in the Southeast is now confined to the Carolinas.

The high flows and high ground water levels in the western part of the Mid-Continent area were mostly a carry-over from summer floods, but in the eastern part they came from melting snows and rains. In Michigan water levels in wells in the Menominee River basin and in Iron County were at high levels, with the water levels in shallow wells in the drift deposits of the north-central part of the southern peninsula rising during the month.

In Wisconsin, Kansas, and Nebraska, key wells were showing higher water levels as a rule. The same was also true in Missouri. In central New England water levels in four states rose as a result of heavy rains.

On Long Island in New York above normal precipitation caused an abrupt reversal of the downward trend of water levels in the shallower wells and an average of almost a foot was observed. There was no apparent effect on the water levels of deep wells, however.

The drought in Texas showed continuing low ground water levels in all areas reporting, with record lows for November in the heavily pumped areas near El Paso, San Antonio, and Houston. Water levels in the western states were generally at a low stage, with places in New Mexico showing an annual net decline greater this year than last year.

The December report shows the drought continuing. However, ground water levels over the country were mostly above normal with many new record highs. In Washington, Wyoming, and Oregon, ground water levels were normal or higher. This was not the case in Utah, California, New Mexico, and Arizona, where ground water levels are still at a low stage. In Michigan and Indiana ground water levels were reported higher in many places. The same was true in the northern and eastern parts of Nebraska, also in parts of Iowa, Missouri, and Kansas.

In New York ground water levels, stream flow and reservoir storage were appreciably above normal, with Croton Reservoir in the New York City system spilling over on December 5.

In the Southeast ground water levels were either normal or above in the Virginias, Kentucky, Tennessee, Georgia, and Mississippi. Ground water levels in North Carolina showed no appreciable change, but in Alabama they ranged from below normal in the southern part of the state, to excessively high in the northern part.

—o—

THE WATER SITUATION IN THE UNITED STATES

(Continued from Page 7)

higher value is placed on water than here. In fact, the future economy of this section is based entirely on its water supply. While the present situation has been brought about by overuse, the needs of the area can be met to a large extent if the problem is attacked wholesale, with proper planning and co-operation between all parties interested.

Mother: "Now before you get serious with him, be sure he is always kind."

Daughter: "Oh, I'm sure he is; he told me that he put his shirt on a horse that was scratched."

—o—

"I've got a lot of things I want to talk to you about," the wife announced.

"That's nice," sighed her husband. "Usually you want to talk to me about a lot of things you haven't got."

—o—

"How would you punctuate this sentence? Mary went swimming and lost her bathing suit."

"I'd make a dash after Mary."

—o—

Boss: "What in the world happened to you? You're over an hour late getting back with those mules."

Hired Hand: "I know it, Boss, but I picked up Father O'Leary on my way home and from there on the mules couldn't understand a word I said."

—o—

"He's left-handed and keeps his change in his right-hand pocket," mentions Cutie Cathead in telling about her boy friend.

NEW REGULATIONS UNDER CMP-6

The NPA has just issued Direction 4 to CMP Regulation No. 6 which sets up a procedure for water well contractors to apply for allotments of materials on a quarter basis beginning with the second quarter of 1952. The water well contractor must submit an application to the NPA each quarter (each 3-month period) for an allotment of steel and copper sufficient for all wells that he will drill during the quarter, except for any wells that may require more than 6 tons of steel or 200 pounds of copper. For each well requiring more than 6 tons of steel or 200 pounds of copper, a separate application must be submitted. The materials for all wells smaller than this are to be lumped together in your quarterly application.

The second quarter application must be sent in by February 15, 1952, and is for the 3-month period of April, May, and June. The application must be made on Form CMP-4C.

With the application due on February 15, each driller must submit a report on the wells drilled and materials used during the period January 1, 1950, to June 30, 1950. This period is considered by NPA as a base period. This report must go in on Form CMP-65 and **must be mailed with the application for materials for the second quarter 1952 only.** The report does not need to be sent with future applications after the second quarter.

Form CMP-4C and Form CMP-65 can be obtained at your nearest NPA or Department of Commerce field office. Direction 4 to CMP Regulation 6 is also available to you at these offices. It is suggested that you get the forms and instructions at once. You should study the forms carefully. Some judgment is necessary in preparing the CMP-4C as it was set up for specific projects rather than for a quarterly application.

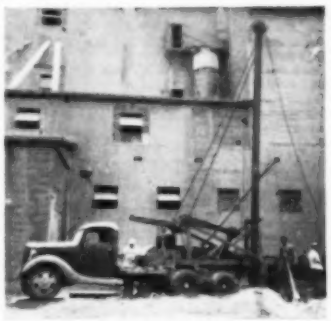
Beginning April 1, 1952, a water well contractor can no longer use the self-authorization procedure that is now in effect. Up to that date, the water well driller can self-authorize on behalf of the owner up to 2 tons of steel or 200 pounds of copper per project, but after April 1 the driller may use only the priority rating given to him with his quarterly allotment. The well owner can continue to use the self-authorization procedure to purchase his own materials and the driller can use the owner's materials without regard to his allotment, but the quantities of materials furnished by the owner must not be included in the driller's quarterly application.

When your CMP-4C application is returned to you by NPA giving you your quarterly allotment of steel and copper, you will get an allotment symbol to use as a priority rating on your orders for steel pipe, copper tubing, and the like. This same symbol with the letters "DO" written ahead of it and certified under CMP Regulation No. 6 can and should be used as a priority rating on your orders for well screens. The materials in the well screens you may require do not have to be covered by your allotment of steel or copper, even though you use the "DO" and your allotment symbol on your well screen orders, because well screens are a Class B product under CMP and we apply directly to NPA for our quarterly requirements.

Contact your nearest Department of Commerce office if you have questions about your application, or write us and we will get the answers for you.

The Water Resources Division of the NPA has been fighting to help water well drillers get materials under CMP ever since the Division was organized in June, 1951. Other governmental agencies have disagreed with the Water Resources Division on a number of points and the present regulation is the result of a certain amount of give and take. It may not be just what we want, but we can be sure that the Water Resources Division has worked hard in the interest of water well drillers.

Lattie Goggins of Elvins, Missouri has been drilling wells for many years in that vicinity. In addition to his water wells which are mostly in rock, Mr. Goggins has drilled many prospect holes for mines in his area. One of his rigs is shown drilling a farm well in the Mississippi River bottoms opposite Quincy, Illinois.



Jungmann Bros. Drilling Company of Topeka, Kansas is equipped and experienced in drilling all types of wells in any location. They operate several rigs and one of them a No. 240 Star is shown drilling a well for Forbes Bros. Central Mills in Topeka. These people ship cereal products all over the world and use large quantities of water in operating the mill.

Son—"Say, Dad, is it Atlas that supports the world?"

Father—"No, Son, that's Uncle Sam."

—o—

She — "Men are contemptible beasts!"

He—"Yeah, I know. That's why I run around with women."

THE LEGAL STATUS OF WATER

(Continued from Page 9)

rule or the rule of Reasonable Use. This departure from the old English or Common Law doctrine of riparian rights occurred in 1862. The court ruling said that "a man's right to use percolating water on his own land is limited by the corresponding right of his neighbor, and restricts each to a reasonable exercise of his own right, a reasonable use of his own property, in view of the similar rights of others." This rule in some form has been followed in many states for ground water where the riparian doctrine was in force.

In 1903 the rule of reasonable use was further changed by the rule of correlative rights or California rule as it is called. Under this rule the Supreme Court of California held that not only must one landowner's use be reasonable, in consideration of the rights of others, but it must be correlated with the uses of others in times of shortage.

The doctrine of Prior Appropriation was developed in the western states where the requirement for irrigation or other beneficial purposes was greater than the available supply. The principal feature of this doctrine is the principle of first in time is first in right, so long as the use is beneficial. There is considerable question among those who have studied our water laws as to which doctrine would be most suitable for our future needs and development. There are many complicated legal questions to be thrashed out, one of them being the final authority or level at which water laws are to be effective. Most people today feel that this level should be the state for the best administration, control, and enforcement. There would have to be close co-operation between the water users of each area regardless of the state they lived in.

To review the status of our water laws as of today, a report was prepared in July, 1950, by Mr. C. L. McGuinness of the U. S. Geological Survey at the request of the President's Water Resources Policy Commission. We are therefore reprinting from that report a partial summary of existing water law by states.

(To be Continued)

ASSOCIATION NEWS

This section is devoted to the exclusive use of water well drillers' associations, both state and local. Notices, announcements, changes of officers and other items should be sent to The Editor, Johnson National Drillers' Journal, 2304 Long Ave., St. Paul, Minnesota.

INDIANA MEETING

The 21st annual convention of the Indiana Well Drilling Contractors Association will be held Wednesday, Thursday, and Friday, April 9, 10, and 11, 1952, in Indianapolis at the New Conservation Building on the State Fair Grounds.

This meeting will be held in a large room with ample exhibition space and all services required to put on a good show. H. K. Carr, of Greentown, Indiana, is Secretary, and he will be glad to furnish information to anyone regarding this meeting.

SOUTH DAKOTA MEETING

The 1952 meeting of this association will be held at the Marvin Hughitt Hotel in Huron, South Dakota, on February 29 and March 1, 1952. Mr. Harold P. Norbeck is Secretary of this group. This is the first annual meeting of this association.

IOWA MEETING

The 23rd annual convention of the Iowa Well Drillers Association was held at the Fort Des Moines Hotel in Des Moines, January 23 and 24, 1952.

A full program of talks and entertainment had been prepared for this meeting and special provision was made for the ladies. A full report of the meeting will be given later. Travis C. Parker, of West Branch, Iowa, Secretary, was in charge of arrangements.

NORTH DAKOTA MEETING

This association held its 36th annual meeting at the War Memorial Building in Bismarck, December 2, 3, and 4, 1951.

Talks by Dr. Wilson M. Laird, State Geologist, and Art Williamson, Director of Municipal Engineering, State Board of Health, and others high-lighted the program, which also included the annual banquet held at the Patterson Hotel and the usual business meetings.

F. V. Sletvold, of Oakes, North Dakota, Secretary-Treasurer of the group, arranged the meeting.

MICHIGAN MEETING

In October, 1951, a statewide meeting of this association was held in Lansing at which time it was decided to do something definite about a licensing law. A committee was appointed to study the question and submit a plan for such a law. On November 25, 1951, the Board of Directors of the Association met with representatives from the Departments of Health and Conservation and presented a proposed draft of a licensing law. It was decided to send a copy of the proposed law to each of the eleven locals asking them for their suggestions, which were then presented to the state representatives by the Board of Directors at another special meeting held December 15, 1951, in Lansing. Mr. Harold Armstrong, Secretary, Battle Creek, Michigan, is familiar with the details of the proposed licensing law. Details may be secured by writing to him.

MISSOURI MEETING

The Missouri Water Well Drillers Association will hold its 1952

(Continued on Page 13)

Mr. J. R. Palmer of Trenton, Florida sent us this picture with the statement that it must be the oldest rig in the State of Florida. The picture is of a 2-inch well 50 feet deep on the Suwannee River. Mr. Palmer, who is now 76 years old, has drilled wells all of his life and is still using the rig shown, which he calls a "poor-man's outfit."

(Continued from Page 12)

meeting in Rolla at the Geological Survey and Water Resources Building on March 10 and 11.

Invitations are being extended to all drillers and manufacturers to attend this meeting as space will be available for inside and outside displays. The usual program of interest and entertainment for drillers has been prepared by Dale L. Fuller, Service Secretary, Rolla, Missouri.

OKLAHOMA MEETING

The Board of Directors of this association have decided to hold their 1952 meeting on October 30 and 31 at the Extension Study Center on the North Campus of the University of Oklahoma at Norman. Further details of the meeting will be announced when available by L. J. Clarke, Secretary, Oklahoma City.

NEBRASKA MEETING

The 21st annual convention and short course of the Nebraska Well Drillers Association will be held at the University of Nebraska, Thursday and Friday, February 21 and 22.

This meeting will follow the same general pattern as past meetings of this association which means there will be a program of interest and entertainment for all. The meetings will be held in Bancroft Hall where larger quarters have been made available. Mr. V. H. Dreeszen, Secretary, can furnish details regarding the meeting.

OREGON MEETING

The Oregon Drilling Association held its annual meeting on December 14, and 15, at the Multnomah Hotel in Portland. Mr. William Bowes, City Commissioner, gave the address of welcome.

This was followed by talks from R. C. Newcomb, District Geologist, U. S. Geological Survey, Clyde Walker, Agricultural Engineer, General Electric Company, and representatives of the NPA and OPS.

Friday evening dinner, dancing, and entertainment were provided for the group at the Club Portland. The next morning there was a demonstration of machines, tools, and bit dressing at the Portland branch of the Star Drilling Company. Sixty ladies were entertained at a noon-day lunch at the Aero Club.

The usual business meetings were held with the 1951 officers re-elected. They are: Ed Steinman, President; Art Gaunt, Secretary; Ed Jannsen, Vice-President. The meeting closed with a social hour on Saturday afternoon at the Multnomah Hotel.

NEW YORK MEETING

The annual election of officers and banquet of the Empire State Water Well Drillers Association was held at Trinkous Manor in Oriskany, January 16, 1952.

Many subjects of interest were discussed. Among those appearing were: Mr. E. S. Asseltine of the U. S. Geological Survey, and others interested in well drilling matters.

After a cocktail hour, the banquet was held, which was followed by square dancing and a floor show. These meetings are always well attended and enjoyed by everyone.

MINNESOTA MEETING

Minnesota will hold its 30th annual meeting in Minneapolis at the Nicollet Hotel on March 20, 21, and 22, 1952.

Mr. Norm Ovram, Executive Secretary, is hard at work arranging a program and entertainment for this meeting. No doubt it will be along the usual lines of a Minnesota meeting with space for manufacturers to exhibit their products and meet their customers. Mr. Ovram can be reached at St. Paul 8, Minnesota, 1495 W. Larpenteur Avenue, for details.

WISCONSIN MEETING

This association will hold its annual convention February 14, 15, and 16 at the Hotel Northland in Green Bay. A special effort is being made to give manufacturers an opportunity to spend more time with the drillers attending.

Plans are being made for a large attendance to take part in the excellent program and entertainment that will be provided. All correspondence should be sent to Ralph H. Nienow, Secretary-Counsel, at Merrill, Wisconsin.

ILLINOIS MEETING

The Illinois Well Drillers Association will hold its 25th annual meeting at the Hotel Kaskaskia in LaSalle on February 7, 8, and 9, 1952.

Toolish and Weaver operate two rigs drilling rock wells in the vicinity of Altamont, New York. In the picture they are drilling a farm well with their No. 50 Keystone truck mounted rig.

This will be in the nature of an anniversary meeting and all old members will be called upon for a short account of their membership and benefits after twenty-five years. Technical meetings will take up the last two days of the meeting, with the annual banquet and entertainment to take up the evening hours. Richard F. Fisher, Urbana, is Executive Secretary.

MISSISSIPPI MEETING

This association will hold its annual meeting July 10, 11, and 12 at Biloxi. Details are not available at this time.

"I am surprised that your mother agreed to your marrying Bill when she dislikes him so."

"Well, she said that she just wants to be his mother-in-law for a while."—Huntingtonian.

—o—

Singer—"Don't you like my voice?"

Accompanist — "Madam, I've played on the white keys and I've played on the black keys, but why must you always sing in the cracks?"

ADVERTISEMENTS

We will insert advertisements for drilling equipment wanted or for sale, help or work wanted, etc., for our readers, free of charge. Advertisements must be brief, and we cannot assume responsibility for them, but will be glad to put parties in touch with each other by this means and suggest that they investigate any offers or inquiries carefully for themselves.

FOR SALE: Fairbanks-Morse Pomona Type Deep Well Turbine pump consisting of a 13-stage 10-inch all bronze bowl section showing no wear or corrosion and designed for 500 g.p.m. 450-ft. head; 380 feet of 6⅝" OD heavy column pipe and 1⅛" diameter shaft; head designed to receive 100 h.p. motor; price less motor $2500.00; if sold within a 300-mile radius of Chicago, we will deliver and install in well, if accessible, for $800.00 additional; we will arrange for motor, if interested. Write: J. P. Miller Artesian Well Company, Box 359, Brookfield, Illinois.

FOR SALE: On account of poor health, selling Armstrong drilling machine at a real bargain; all steel semi-anuel mounted on a good Dodge truck two-ton rear end; good tires; 33-ft. mast power hoist powered by good Waukesha motor; 500-ft. good drilling line; 500-ft. good sand line; well spool 1,000 ft. of line; shock absorber in top of mast; three strings of drilling tools 1—18-ft. 4" stem; 1—12-ft. 4"stem; 1—18-ft. 3" stem; swivel rope socket; three sets drilling jars; 2—8" set, 1—10" set, six 6¼" drilling bits, good length, 2—5" drilling bits, 4—4" bits; driving clamps, blower and anvil; 8 bailers dart and flat bottom; and circle jack; elevators different size, sledge hammers, chain tighteners; $2,500.00, f.o.b. Write: C. F. Simpson, 1000 S. Cedar, Nevada, Missouri.

WANTED TO BUY: Used drill stem 5" diameter by 16' length; 2x3 or 2¼x3¼x7API pin jt; 3¼x4¼x7 API BOX jt; 5" w. sq; 1 set tool wrenches, 5" sq. jack end; 1 circle jack for 5" sq; 12" drill bits 3¼ x 4¼ x 7API jt; 600 lb. Write: J. Kriska, Seffner, Fla.

FOR SALE: 22W Bucyrus-Erie, 240 Star, trucks, welders, and tools. Write: Gearld E. Foster, P.O. Box 1135, Sonoma, California.

FOR SALE: 71 Speed Star, power hoist on derrick, complete with 6" drilling tools and 900' cable and sand line; mounted on International truck; all in good condition. Write: Leon Fredebaugh, Grand River, Ohio, Phone Painesville 3816.

FOR SALE: Several deep well pumps, 30 h.p. oil and water lubricated for 4-inch and 5-inch casings. For detailed information, write: General Wrecking Company, 3304 Chouteau Avenue, St. Louis 3, Missouri.

WANTED TO RENT: With option of buying, one heavy duty portable rotary rig; must have a 2500' capacity; as near complete as possible; all details in first letter. Write: C. O. Anderson, Archerwill, Sask., Canada.

FOR SALE: One drill stem 3x12 bit and jars; one drill stem 2x10; two bits and wrenches for the 2-inch stem. Reasonable price. Write: Ed Engebretson, Ortonville, Minn.

FOR SALE: For immediate delivery one #10 Howell Demountable jetting machine mounted on Model A Ford truck; complete with jetting hose, swivel, pump rods, drill bits, etc. Unit is only two years old with little use. Write: Richfield Plumbing Company, 7640 Lyndale Avenue South, Minneapolis, Minnesota.

FOR SALE: Slim Hole rotary drill rig, on White truck 55' A-F frame derrick, 6x6 Wheatley pump with Minn-Moline engine, double drum, hoist with 35 h.p. Moline engine; Weise rotary table; approximately 400 ft. 3½ x 20' stems, with Hughes Acme 3½ joints, 4½" square Kelley 24' with 6¼ x 20' heavy drill collar to hold tri-cone Hughes bits, in alignment; Mud mixer, hoses and small tools complete, ready to go, including tri-cone Hughes bits from 10" to 5½" in size; heavy duty Army dual trailer for hauling stems, collar and Kelley back of truck with bolsters, etc. A bargain at $7,500.00 cash, f.o.b. Delafield, Wisconsin; also Heavy No. 25 Armstrong machine, trailer mounted, A frame derrick, roller bearing, jack-shaft on rig; ready for portable engine; bargain at $500.00. Write: Gray Well Drilling Company, Inc., P. O. Box 181, Delafield, Wis.

WANTED TO BUY: A small cable tool drill with or without tools and with or without truck; this should be similar to Star No. 240 or Bucyrus-Erie No. 20-W. Write: Box SPW, c/o Edward E. Johnson, Inc., 2304 Long Avenue, St. Paul 4, Minnesota.

FOR SALE: Model 3½ Keystone wood frame, steel mast, mounted on a 42 Reo truck; both machine and truck in good condition, complete with tools for only $1,700.00; also a 22-W Bucyrus-Erie mounted on a 40 International truck short wheel base, 1000 x 20 tires good, air brakes; machine has Dual cat heads, spooling device, casing reel, all new cables; complete with tools all for $4,200.00; both machine and truck in good mechanical condition. Write: Paul N. Wright. R.D. 3, Bellefonte, Pennsylvania, telephone 4241.

FOR SALE: Bucyrus-rig complete with hand and drilling tools mounted on Ford V-8 truck; all steel dog house; 3000 watt light plant; 1947 Ford winch truck with gin poles; bulldozer with 6' blade and winch with 200 hours running time; Steel tool box; equipment in A-1 shape. Ready to go to work. Price $7,400.00. Write: Harry M. Kime, 820 Edgar, Mattoon, Illinois.

FOR SALE: 21-W Bucyrus-Erie mounted on D-35 International truck; tools for 3" and 4" hole; 500' - ⅝" drill cable; 350' of ⅝" sand line; tool wrenches; tool tightener; 3" and 4" bailers; machine and truck in first-class condition; good rubber; good cab; with all glass intact; all this equipment in first-class condition. Write: W. G. Law, Troy, Alabama.

FOR SALE: One No. 44 Standard 1950 Cyclone rig, 18 months old, mounted on 1936 Dodge; two speed rear axle; machine and truck ready to go, no tools; also 1946 — 22 W Bucyrus rig, trailer mounted; casing reel and spooling device; Buda motor; machine ready to go. Write: R. R. Long, Old State Road, Jacksonville, Illinois, phone 512.

FOR SALE: A well built solid tool rig, capable of drilling 3", 4", and 5" wells; mounted on Dual Wheel rubber tire trailer; both 3" and 5" string of tools; also other 5" well tools; will sell very reasonable; leaving for service so selling out; rig also suitable for repairing wells. Write: Jim Lohse, Elbow Lake, Minnesota.

FOR SALE: One 22-W Bucyrus-Erie drill complete with derrick hoist, spooling device, casing reel, starter and generator, mounted on 1940 Chevrolet cab over truck, two speed axle; machine and truck in good condition. Price complete for machine and truck $5,000.00. Write: Hoeg & Ames, Lincoln, Iowa.

WANTED TO BUY: A pair of drill bits that will work in a 4" pipe and jars of like size; also pair of 6" bits to fit 4" and 4½" drill bar; and two large claw end drill wrenches three and one half square. Write: Adolph Rude, Flandreau, South Dakota.

FOR SALE: One Peerless, 7½ H.P. 1,800, 3P, 60C, 220V, 80' 6x1½x1" col-two 8" LA bowls, 200 gal @ 60 ft. $600.00; two sets unused 12" bowls; 1,000 gal 90 ft. 8" col. $250.00 each; one unused 180 H.P. marine Continental engine and reduction gear. Write: American Drilling Company, Box 93, Little Silver, New Jersey.

FOR SALE: Well drilling business and equipment, including 45 x 100 warehouse and shop; doing a good business and good outlook for spring; must sell because of poor health. Write: F. E. Mead Well Drilling Company, St. Cloud, Minnesota.

FOR SALE: Money making water well drilling and pump business; three all steel well drills truck mounted, home and one and half acres of land panel and two trucks for service; get rid of casing worries, basalt formations, very little casing here; sell any part or all, might do some trade; wish to retire; Write: A. R. McInroy, Box 11, Clarkston, Washington or phone 2531-W.

WANTED: Cable tools 17¼, 15¼ and 13¼ drill bits any joint. Write: Trask Artesian Well Company, 287 Main Street, Norwich, Connecticut.

FOR SALE: Late 1949 No. 44 Cyclone oil field drill mounted on 1940 3-ton International truck with blower and lines; no tools. Write: R. R. Long, R.R. No. 6, Jacksonville, Illinois, telephone 512.

FOR SALE: Failing and Sullivan rotary drills, complete, truck mounted, tools, drill rod, etc. priced $5,000.00 to $8,500.00. Write: Fred E. Butler, Box 1832, Casper, Wyoming.

FOR SALE: 21-W, Style D Mounting, less truck, including cable and sand line, catheads on machine; condition of machine good; purchased new in March, 1948. Write: Leo Lutz, Osceola, Wisconsin, phone LD 212.

FOR SALE: A Keystone No. 4 well drilling machine, mounted on a 2-ton International truck; good tires and truck in good condition; equipped with tools and lines; has a steel "A" Nash derrick 36 ft. high; this machine is in good running condition; also good power plant; price reasonable. Write: W. K. Massey, 693 Lawton Street, S. W., Atlanta, Georgia, Phone Franklin 2368.

FOR SALE: One Marvel well machine mounted on truck, equipped with tools; also another set of drilling tools; cheap; reason for selling is death of owner. Write: Mrs. Herman Miller, R. D. No. 1, Montoursville, Pennsylvania.

WANTED TO BUY: One 6" drill for 3" diameter bar 1½ by 2¼ 8a P.I. thread; also one good used welder 200 or 250 amp capacity 4 cylinder V type motor preferred; also one substitute 1½ by 2¼" API pin 8 - 1⅝" by 2⅝" 7a P.I. box; also one swedge for screen for 4" diameter wells and one swedge for screen for 6" diameter wells. Write: Carl Bolliger, 411 E. Oak, Fairbury, Ill.

FOR SALE: No. 160 Howell Machine mounted on 3-ton International truck with winter inclosure. 1,500' of ¾" drill line, some of sand line. 2 Drill Stems, one 3", one 5"; 2 - 5½" Drill Bits; 1 - 5" Drill Bit; 1 - 6" Drill Bit; 1 - 8" Drill Bit; 1 - 4" Drill Bit; 2 - 4" Bailers; 1 - 5⅝ Swedge; Bit Wrench, Hand Tools, Jackscrews, etc., Grease Outfit. Jetting Attachment complete mounted on two-wheel trailer, twin cylinder jetting pump 4½" powered by 4 cylinder LeRoi engine 3⅝ x 3½" bore, gasoline or natural gas manifold. 150' 1" extra heavy drill rod. 1937 Ford water tank truck power take-off pump. Portable electric welder on two-wheel trailer Hobert type M.B. 200 amp. 4 cylinder gasoline motor, used very little. Rig in A-1 condition. Hasn't been used since it was overhauled. Price, $5,000.00. Write: Carl Settle, Box 677, Wibaux, Montana.

F. M. Carnes of Slocomb, Alabama is well known throughout Southeast Alabama and Northwest Florida for his well drilling. In the picture the output is 45 gallons per minute.

FOR SALE OR TRADE: Mobile drill earth augering machine with 100 feet of 4½" augers, capable of drilling 125 ft. Walls up its own hole in otherwise loose formations, like gravel. Also wanted to buy: Bucyrus-Erie 20W or 22W or similar machine with tools, prefer 3", 4", and 5" tools. Must be a bargain and in good condition. Write Elmer Crain, 311 W. Division Street, Boyne City, Michigan.

FOR SALE BY OWNER: One 6 stage Smithway water lubricated deep well turbine, complete with right angle gear drive for 500 g.p.m. 225' total head, 1,760 r.p.m. 70 feet 6" x 1¼" column, 20' suction pipe, prelubricating tank and fittings; pump brand new never uncrated; price $1,850.00, immediate delivery. Write or wire, Box ABC, 2304 Long Avenue, St. Paul 4, Minnesota.

FOR SALE: Fort Worth spudder, model C, built to handle up to 3,500 pounds of tools down to about 500 feet or will drill small holes to 1,500 feet; tools from 6" to 18"; International K-7 truck; rig was rebuilt two years ago and in good condition. Write: W. D. Jones, Route 3, Hereford, Texas, telephone 9008-F3.

FOR SALE: Bucyrus-Erie 28-L, semi-trailer mounting; purchaesd new August 1948; excellent condition; price $13,750.00, with complete line of tools and extra equipment $17,500.00. Write: R. S. Knapp, 8845 Main Street, Clarence, New York.

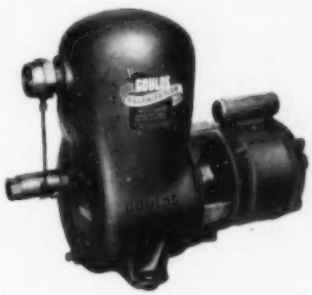
FOR SALE: Drilling business in Farmington, Michigan; one Cyclone '42; four years old, drilling machine truck mounted with 600 ft. new cables; one 1946 Studebaker 1½ ton truck with built-in tool boxes; modern drilling and retrieving tools for 3", 4", 5", and 6" wells; also surging blocks, threading dies, and pipe cutters from ⅛" to 6" acetylene torch, several hundred dollars in small tools too numerous to mention; $6,500.00; plenty of work, room for expansion to four drilling machines or more; other interests, reason for selling. Write: Joseph N. Cauffiel, 29093 List Street, Farmington, Michigan, telephone Farmington 2405.

FOR SALE: One #240 Speed Star rig in first-class condition; self starter, power unit, slow speed catheads; 33' mast and a complete string of 4" tools, rig mounted on K-5 International truck, truck in first-class condition; good tires, and will go anywhere; rig now drilling. Write: George I. Warner, McBean, Georgia, telephone 4-2632.

Excited Husband—"Doctor, will you please hurry right over. My wife has an attack of appendicitis."

Doctor—"Now that's impossible. I took out her appendix two years ago. Don't tell me that she's grown a new one?"

Husband—"Don't tell me my wife doesn't have appendicitis! And she hasn't a new appendix. I have a new wife."



NEW GOULDS PUMP

Production of a new tankless domestic water system, the Close-Cupld Balanced-Flow Jet, has been announced by E. E. Backlund, Sales Manager, Goulds Pumps Inc., Seneca Falls, N. Y.

The unit is "the only pump of its kind", according to Backlund—a complete, self-contained, shallow-well water system that operates without a storage tank. Within pump capacity (520 GPH at 10 ft. suction lift), the Balanced-Flow's self-adjusting capacity feature provides fresh running water in just the quantity desired, no matter how many outlets are in use at the same time.

The Close-Cupld construction of the new pump offers several important selling features. Permanent alignment, quiet operation and freedom from wear are assured. The rotating impeller is the only moving part. Installation is simple—and the pump can be installed almost anywhere, since it measures only 20" x 11½" x 15" overall.

Important engineering steps have been taken to resist corrosion in the new pump. All cast iron parts touched by water are treated with a special coating (similar to that inside food cans) to resist rust. The impeller, guide vane and diffuser are made from modern, durable, non-corrosive plastic.

The new Balanced-Flow unit will retail at about $109.50. This price, Backlund feels, will be a strong selling point, inasmuch as it is the whole cost—customers need not buy a tank.

Backlund stated that the pump is now in full-scale production, and that descriptive literature is available. Inquiries are invited.

LIKE THE STERLING MARK ON SILVER

"JOHNSON" on well screens stands for the very finest. It guides you to a screen which represents half a century devoted to research, engineering, and manufacturing . . .

A product upon whose development many dollars in research have been expended . . .

A product perfected through years of manufacturing experience . . .

It guides you to the world's oldest exclusive manufacturer of well screens.

Remember this name when you buy a well screen—it is a sign post to finest quality that costs you no more.

A FIRM'S GREATEST ASSET IS THE CONFIDENCE OF ITS CUSTOMERS.

EDWARD E. JOHNSON, INC.

— Manufacturers Exclusively Since 1904 —

ST. PAUL 4, MINN.

SEE OUR CATALOG IN SWEET'S